7160/ 2/ 2025
Mathematics/ AL

SOUTH WEST REGIONAL MOCK EXAMINATION
TECHNICAL AND VOCATIONAL EDUCATION

The Teachers' Resource Unit (TRU) in collaboration with the Regional Pedagogic Inspectorate -Sciences and the South West Association of Mathematics Teachers (SWAMT)	Subject Code 7160	Paper Number 2
CANDIDATE NAME .... CANDIDATE NUMBER .... CENTRE NUMBER	Subject title MATHEMATICS	
TVE ADVANCED LEVEL	DATE: 24/03/2025 Day: MONDAY, AFTERNOON	

Time Allowed: THREE HOURS

INSTRUCTIONS TO CANDIDATES

- THIS PAPER CONTAINS TEN QUESTIONS (FOR ALL SPECIALTIES).
- ANSWER ALL TEN QUESTIONS IN THE SPACES PROVIDED
- FOR YOUR GUIDANCE, THE MARK ALLOCATION FOR EACH PART OF A QUESTION IS INDICATED.
- MATHEMATICAL FORMULAE BOOKLETS AND NON PROGRAMMABLE CALCULATORS ARE ALLOWED
- IN CALCULATIONS, YOU ARE ADVICED TO SHOW ALL THE STEPS IN YOUR WORKING, GIVING YOUR ANSWER AT EACH STAGE.

Insert the information required in the spaces provided above.

You are reminded of the necessity for good English and orderly presentation in your answers.

You are advised to read carefully through the question paper, before you begin your answers.

1) a) P is a polynomial function of real variables x defined by $P(x) = 3x^3 + 2x^2 - 19x + 6$

i) Show that $(3x - 1)$ is a factor of P

(1.5 marks)

ii) Find three real numbers $a, b, and\ c$ such that $P(x) = (3x - 1)(ax^2 + bx + c)$

(1.5 marks)

Hence, or otherwise solve in $\mathbb{R}$ the equation

b) i) $P(x) = 0$

(1.5 marks)

ii) $3e^{3x} + 2x^2 - 19e^x + 6 = 0$

(1 mark)

iii) $3(lnx)^3 + 2(lnx)^2 - 19(lnx) + 6 = 0$

(1.5 marks)

c) Consider the quadratic function: $T(x) = x^2 - 6x + 10$

i) Show That $T(x) > 0, \forall\ x \in \mathbb{R}$

(1 mark)

ii) Solve the equation $T(x) = 2$

(1 mark)

iii) Solve the equation $T(x) = -3$

(1 mark)

(10 marks)

2) A capital $U_0 = 3{,}500{,}000\ Frs$ is placed in a bank at 3% per year of compound interests.

U_n is the capital obtained after n years.

(a) i) Determine the nature of the sequence (U_n) and express it in terms of n

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--(3marks)

(ii) Calculate the value of the capital after 10 years

--(3 marks)

b) Z_n Is a progression defined in the set of complex numbers, $\mathbb{C}$, such that $Z_0 = \sqrt{3} + i$, $\forall n \epsilon N$, $Z_{n+1} = -2Z_n$

i) Calculate $|Z_0|$, $|Z_1|$ and $|Z_2|$

--(3 marks)

ii) Express $|Z_{n+1}|$ in termes of $|Z_n|$.

--(1 mark)

(10 marks)

3) Given that g is a function defined by $g(x) = (1+x)e^{-x}$

(i) State the domain of definition D_g of g

--(1 mark)

(ii) Evaluate the limits of g at the bounds of its domain of definition

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--(2 marks)

(iii) Determine the derivative g^{-1} of the function g, and establish its table of variations.

--(4 marks)

(iv) State the equation of an asymptote if any.

--(1 mark)

(v) Sketch the curve C_g of g on an orthonormal reference system$(0, \vec{\imath}, \vec{\jmath})$ where $|\vec{\imath}| = |\vec{\jmath}| = 2cm$

--(2marks)

(10 marks)

4) The faces of a cubic die are numbered **1,2,3,4,5 and 6** and their probabilities of appearances are given on the table below

Number of the face	1	2	3	4	5	6
Probability of appearance	0.160	0.168	0.179	0.173	0.148	0.172

(a) At the time of a launching this die, what is the probability of obtaining:

(i) an even number

-----(3 marks)

(ii) a number strictly greater than 3

-----(3 marks)

(b) If this die is launched continuously six times what is the probability of obtaining exactly 1?

-----(4 marks)

5) In preparation for a seminar workshop, a bakery produced 3 types (small, medium and big sizes) of cakes for the participants of the workshop. Altogether, 215 cakes were baked.

Let the total number of small size cakes be X, the sum of medium size be Y, and those of large size cakes be Z. The number of medium sized cakes were doubled those of big size, and those of the small sizes were greater than those of medium size by 15.

a) Write down three equations representing the above information.

-----(3 marks)

b) How many of each of the types of cakes were produced?

-----(3 marks)

c) The estimated cost of production of each large cake is 1.000FCFA and those of medium is 650FCFA and small sizes were 400FCFA. Calculate the total estimated cost of production

-----(2 marks)

d) How much was paid if a discount of 14% was given to the party organizer?

-----(2 marks)

(10 marks)

6) (a) A circle passes through the points $A(-3,2)$, $B(0,-1)$ *and* $C(3,2)$

(i) Determine the equation of the circle

-- **(4 marks)**

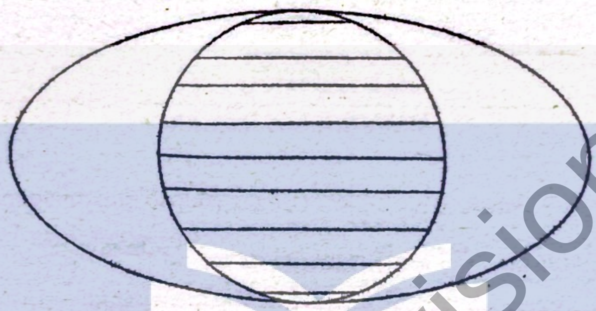
(ii) Find the coordinates of its Centre

--(1 mark)

(b) Consider the equations of the two conics:

A: $(x-2)^2 + y^2 = 4$

B: $(x-2)^2 + 4y^2 = 16$ and the sketch of their representative curves in the diagram below.



On the above sketch,

i). Draw the axes on the sketch of the conics ------------------------------------ **(1 mark)**

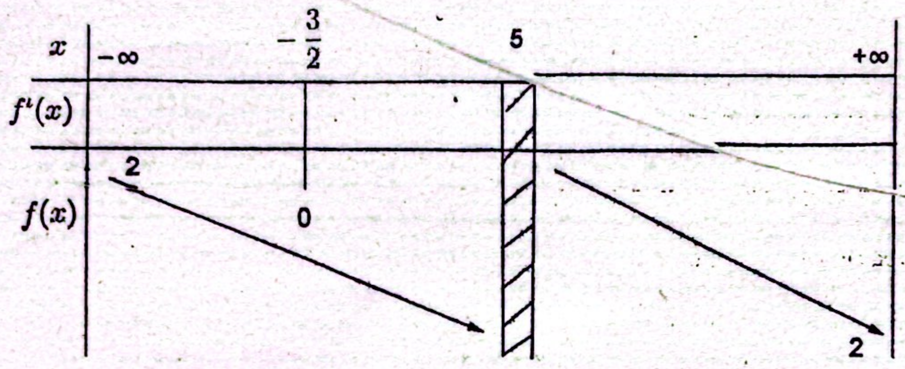
ii) Identify the two conics as A and B, and plot the coordinates of the Centre, Vertices and Foci, where necessary. **(3 marks)**

iv) Calculate the area of the unshaded region. (Leave your answer in terms of π.

-- **(1 mark)**

(10 marks)

7) Below is a table of variation table of a function f



a) Complete the table. (1 mark)

b) State the equations of the asymptotes.

-- (0.5 mark)

c) Given that $f(x) = \frac{ax+b}{cx-5}$ where a, b, c $\in \mathbb{R}$. Use the table to determine the values of $a, b,$ *and* c. Then write out $f(x)$ completely.

-- (3 marks)

d) Sketch the graph, C_f of f, given that $|\vec{i}| = |\vec{j}| = 1cm$

-- (2 marks)

e) Show that the primitive of f is given by $F(x) = 2x + 13ln|x-5| + k$

--(2 marks)

f) Hence or otherwise, calculate the area of the finite region bounded by C_f, and the lines $x = 6, x = 9, y = 2$

--(1.5 marks)

(10 marks)

8) (a) The fourth term of an A.P is 21, and the eleventh term is 35. Determine

(i) the common difference of the A.P

(3 marks)

(ii) its first term

(2 marks)

(iii) the sum of the first fifteenth terms.

(2 marks)

(b) Determine the value of x for which $2\log_a x - \log_a(x-1) = \log_a(x-2)$

(3 marks)

(10 marks)

9) (a) Find the range of values of x for which $|2x-3| < |x+3|$

(5 marks)

(b) A telephone is sold at 60,000 FRS. This selling price experiences a reduction of x % and again a second reduction of 15% on the already reduced selling price and the telephone is finally sold at 45,900FRS.

(i) Determine the value of x

(3 marks)

(ii) Determine the different amount of money reduced as discount at each reduction.

(2 marks)

(10 marks)

10) (a) $q(x) = 4cosx - 5sinx$

(i) Determine $q^1(x)$

(2 marks)

(ii) Express $q(x)$ in the form $R\cos(x + \theta)$

(1.5 marks)

iii) Determine the values of R and θ

(1.5 marks)

(iv) Determine the general solution for the maximum value of $q(x)$

(2 marks)

(b) Simplify and show that $\frac{\sqrt{18}}{3} = \sqrt{2}$

(1mark)

(c) Solve the equation $\ln(x + 9) = 2\ln(x + 3)$

(2 marks)

(10 marks)